

II. Rejection of Claims Under 35 U.S.C. §103(a)

Claims 1-7, 9-18 and 21-24 are rejected under 35 U.S.C. §103(a) over U.S. Patent No. 4,153,427 to Bissett et al. (hereafter "Bissett"); and claim 20 is rejected under 35 U.S.C. §103(a) over Bissett as applied to claim 1, and further in view of U.S. Patent No. 5,657,704 to Schueler. These rejections are respectfully traversed.

Bissett cannot reasonably be considered to teach, or to have suggested, "an inner diameter of the pipe in the heater becomes larger gradually or stepwise along a direction of the flow of the mixture," and "heating the mixture with a heater to convert at least a part of the water in the mixture into a form of steam," as recited in independent claim 1.

The Federal Circuit provides that when the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value. See, e.g., *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956 (Fed. Cir. 2000). In other words, proportions of features in a drawing may not be relied on to show particular sizes if the specification is completely silent on the issue.

Referring to Bissett, the specification does not indicate that the drawings are to scale and is silent as to dimensions. The specification of Bissett merely teaches a system for feeding coal into a gasifier operating at high pressures in which coal and water are pre-mixed in a premix chamber 14 to provide a slurry, which is then maintained in a slurry state by a second premix chamber 16. The slurry is pressurized by a high pressure pump 22, passes through preheater 30, and is introduced into an entrained bed dryer 26. Simultaneously, steam superheater 34 produces super heated steam, which is then introduced into the entrained bed dryer 26.

The super heated steam and the slurry are introduced at the nozzle 36. The slurry and the super heated steam must be mixed immediately and thoroughly at the point of contact

(i.e., nozzle 36) within the entrained bed dryer 26 in order to vaporize the water in the slurry without excessively heating the coal. Otherwise, such excessive heating could result in the agglomeration of the coal particles and in the deleterious deposition of tars and the like within the entrained bed dryer 26. See Bissett, for example, col. 3, lines 3-9, and col. 4, lines 1-9.

The nozzle 36 of Bissett achieves the desired blending or mixing of the slurry and steam within the inlet end of the entrained bed dryer 26. Specifically, Bissett discloses that the nozzle is preferably of the type wherein the steam and coal slurry are injected from the nozzle into the chamber along separate but intermingling paths such as provided by a swirling-type nozzle to achieve the intimate blend of the steam and slurry immediately upon entering the entrained bed dryer 26. See Bissett, for example, col. 4, lines 15-24.

Importantly, the nozzle 36 of Bissett provides immediate mixing of the coal slurry and the steam. Such immediate mixing can only be achieved by using a shorter rather than longer pipe. Applicant therefore submits that the nozzle 36 of Bissett is very short. As such, it is improper to allege that an inner diameter of the nozzle 36 of Bissett becomes larger gradually along a direction of the flow of the mixture because the short length of the nozzle 36 of Bissett makes it impossible to manufacture it so that the inner diameter gradually increases along a direction of the flow. Accordingly, for at least these reasons, it is clear that the specification of Bissett cannot reasonably be considered to teach, or to have suggested "an inner diameter of the pipe in the heater becomes larger gradually or stepwise along a direction of the flow of the mixture," as recited in independent claim 1.

Further, as noted above, reliance on the drawings for proportions of features is improper where the drawings do not indicate that they are to scale. Referring to the drawing of Bissett, Applicant submits that Fig. 1 does not indicate that it is to scale. Accordingly, the Office Action fails where it asserts, for example, on page 3, that Fig. 1 suggests "wherein an

inner diameter of the pipe in the heater becomes larger gradually or stepwise along a direction of the flow of the mixture."

Moreover, the diameter of the nozzle 36, which is alleged to increase gradually along a direction of flow, is that of a sheath that covers the pipe through which the coal slurry and coal travel through. Because the diameter, which is alleged to increase gradually along a direction of flow, is not the inner diameter of the pipe through which the coal slurry and coal travel through, Bisset cannot be considered to teach, or to have suggested, "an inner diameter of the pipe in the heater becomes larger gradually or stepwise along a direction of the flow of the mixture," as recited in claim 1.

Additionally, the assertion that Applicant has not disclosed that the location or shape of the inner diameter of the pipe has an advantage is without merit. There are many instances in Applicant's specification in which the criticality of the location or shape of the inner diameter of the pipe is discussed. For example, the criticality of the shape of the inner diameter of the pipe is discussed beginning at page 4, lines 1-9, of the specification. Specifically, lines 1-9, disclose that the flow rate of the mixture may be controlled properly with diameters of the pipes being set in a proper range to thereby feed the mixture to the reactors in a stable manner without abrasion or sedimentation of the burnable solid in the pipes throughout which the mixture flows.

Further, page 8, line 29 - page 9, line 3 provides optimal ranges for the upper limit and lower limit of the flow rate. The specification provides that if the flow rate exceeds the upper limit, the pipes wear out heavily; whereas if the flow rate is lower than the lower limit, the pipes clog easily because of the sedimentation of the burnable solid. See, the specification, for example, page 8, line 29 - page 9, line 3. Importantly, as mentioned above, the flow rate depends upon the diameter of the pipes. As such, the erosion of the pipe is directly related to the diameter of the pipe, or in other words, the shape.

Accordingly, for at least the reasons discussed above, Applicant submits that the assertion that Applicant has not disclosed that the location or shape of the inner diameter of the pipe has advantages is without merit.

Additionally, no objective evidence of record has been shown to support the statement in the Office Action, on page 4, that "one of ordinary skill in the art, furthermore, would have expected Applicant's invention to perform equally well with either the location or shape of Bissett or the claimed location or shape because both locations and shapes perform the same function equally well."

Further, as noted above, Applicant submits that Bissett cannot be reasonably to teach, or to have suggested, "heating the mixture with a heater to convert at least a part of the water in the mixture into a form of steam," as recited in independent claim 1. For example, pre-heater 30 is to heat a slurry to a temperature of 0-100 F below the saturation temperature. Thus, no steam is produced by the pre-heater 30. See Bissett, for example, col. 3, lines 47-49. Steam superheater 34 produces steam of a temperature in a range of from 100 F above saturation temperature to 1500 F. See Bissett, for example, col. 3, lines 61-64. However, no steam is generated from the mixture (slurry) before the mixture is mixed with the superheated steam supplied by the superheater 34. Accordingly, pre-heater 30 and superheater 34 cannot be considered to correspond to the claimed heater. Furthermore, the heat generated by the entrained bed dryer 26 does not heat the mixture with a heater to convert at least a part of the water in the mixture into a form of steam. Rather, the steam supplied by the steam superheater 34 causes the water in the mixture to turn into steam when the steam from the superheater 34 mixes with the mixture at the outlet end of the nozzle 36. See Bissett, for example, col. 4, lines 1-4 and lines 25-29.

Finally, the Office Action fails where it asserts, for example, on page 3, "feeding the whole mixture to a combustion furnace or gasification reactor." For example, in Bissett, in

the entrained bed dryer 26, water present in the mixture is evaporated with the heat brought by the super heated steam so that the coal becomes dry. Thus, the whole water contained in the slurry is separated from the coal. Next, the steam is removed by the cyclone separator 40. The remaining coal is then fed to the gasifier 42. Importantly, only the coal is fed to the gasifier 42, and not the whole mixture (which Applicant claims as a burnable solid and water) as alleged by the Office Action.

For the totality of the above discussion, Bissett cannot reasonably be considered to teach, or to have suggested the combination of all of the features positively recited in independent claim 1. Further, claims 2-7, 9-18, and 20-24 are also neither taught, nor would they have been suggested, by Bissett, even in combination with Schuler, which is not applied in a manner that would overcome of the above-identified shortfalls in the application of Bissett to the subject matter of at least independent claim 1, for at least the respective dependence of these claims directly or indirectly on an allowable independent claim 1, as well as for the separately patentable subject matter that each of these claims recites.

Moreover, contrary to the Office Action's assertions, there is no objective evidence that "the heating is carried out with a heating medium of a temperature of from 200 to 600 degrees C," as recited in dependent claim 18. Bissett merely discloses a pressure of the gasifier 42 being 100 to 1500 psi, and a desireable temperature of the coal within the entrained bed dryer 26 being 700 F or 371 C.

Accordingly, reconsideration and withdrawal of the rejections of claims 1-7, 9-18 and 20-24 under 35 U.S.C. §103(a) as being unpatentable over Bissett, or Bissett and Schuler, are respectfully requested.

III. Conclusion

In view of at least the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-7, 9-18

and 20-24, in addition to the indicated allowable subject matter of claims 8 and 19, are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Attachment:

Petition for Extension of Time

Date: August 30, 2007

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